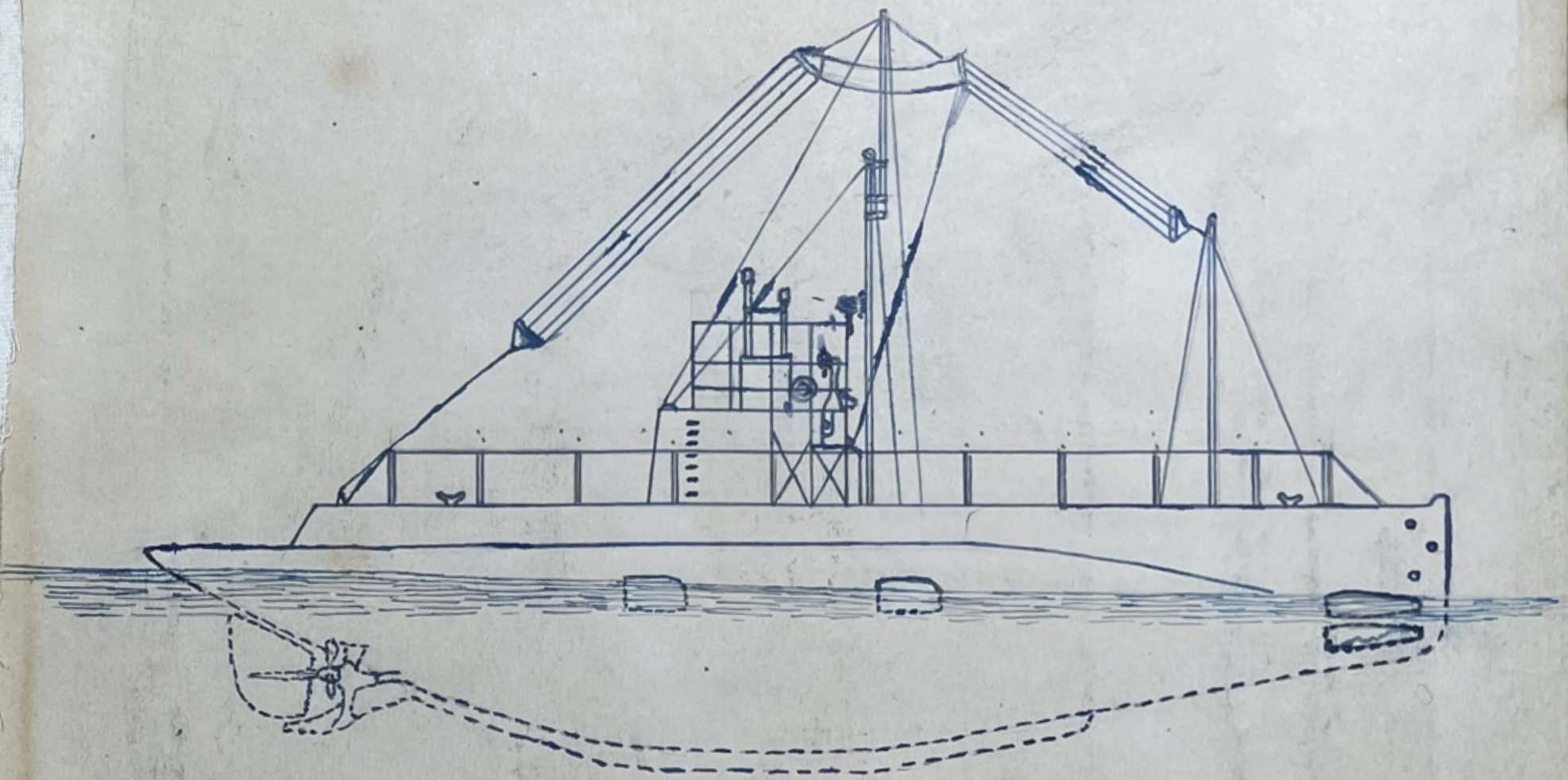
Louis C. Gilde,
Submarine School,
Sub. Base,
New London,
Conn.



## Lake Type.

1.- Watertight Superstructure.
2.- Hydroplanes for submerged control.
3.- The rising axis instead of straight spindle form.
4.- The equilibrium control.

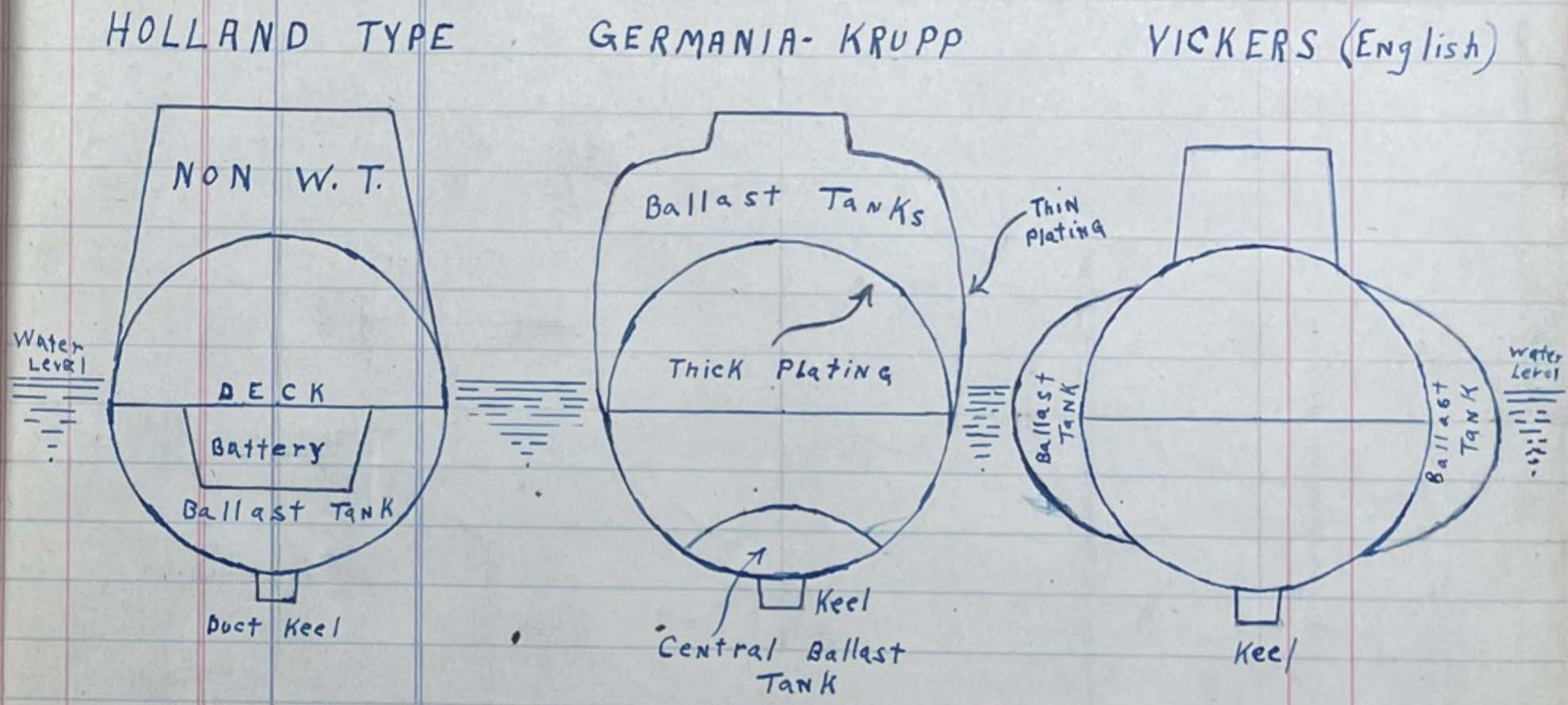
## Holland Type.

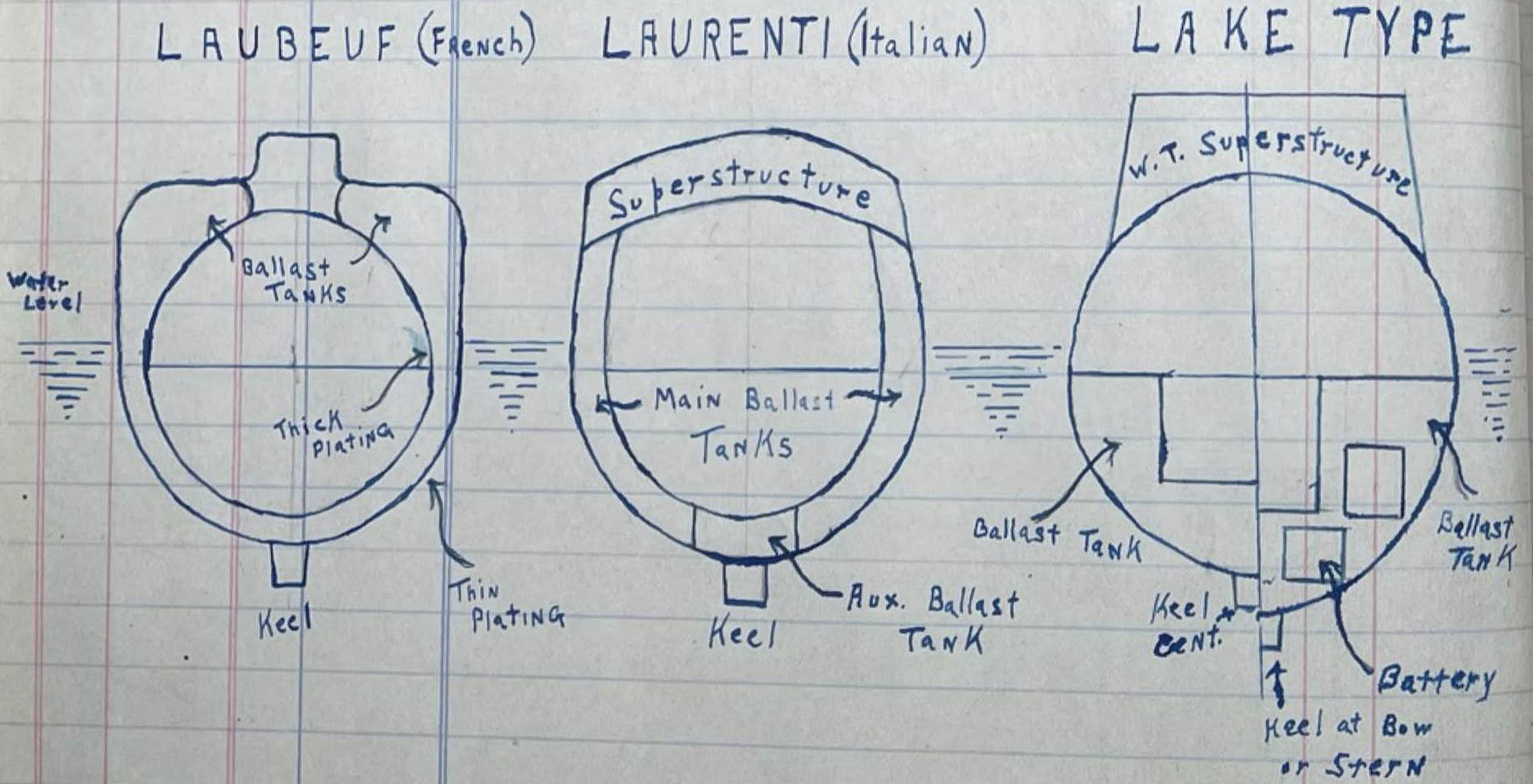
1.- Single hull type.
2.- Now Watertight superstructure.
3.- Divided from three to five separate compartments by watertight bulkheads.

Remember that:

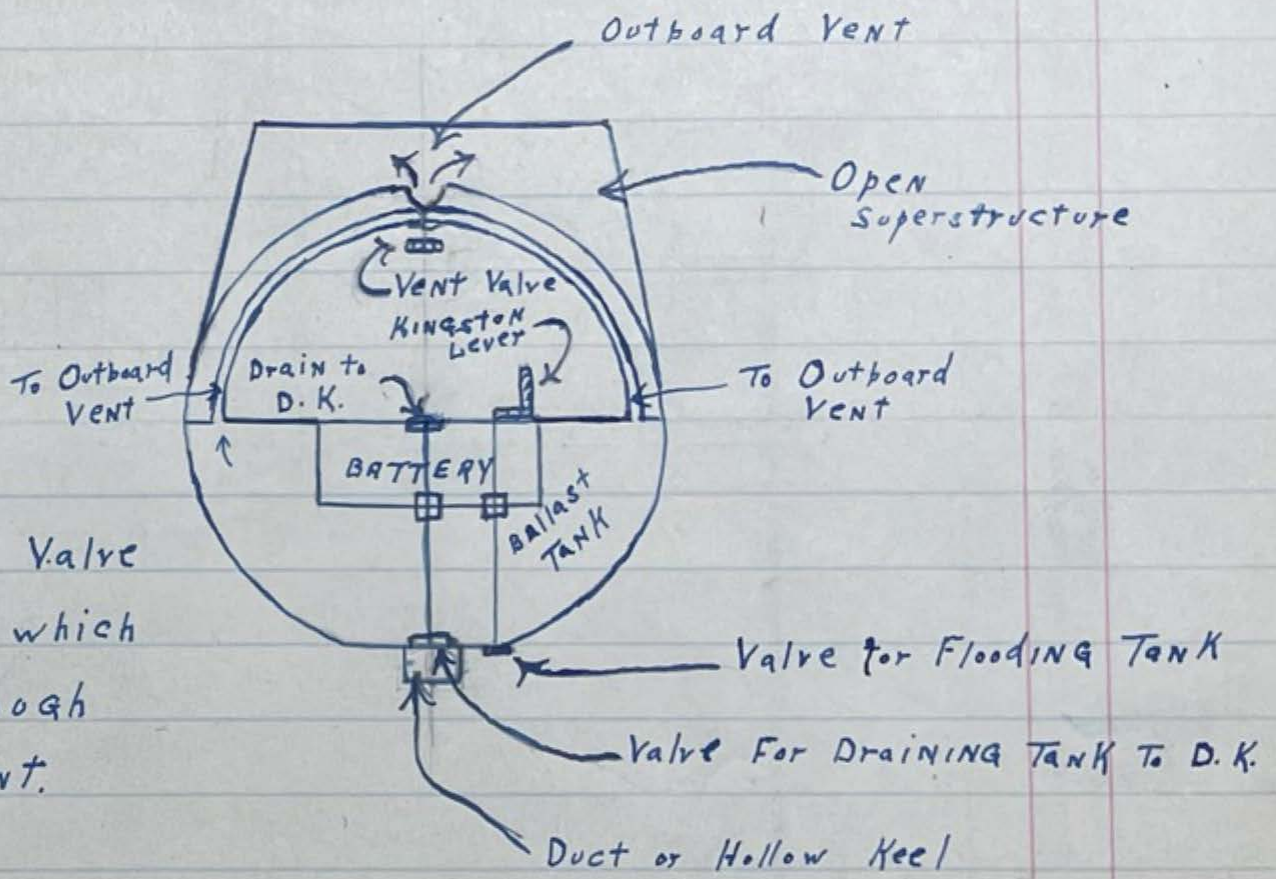
A submarine or oil of less weight will float.

# Six Prominent Types of Submarines.



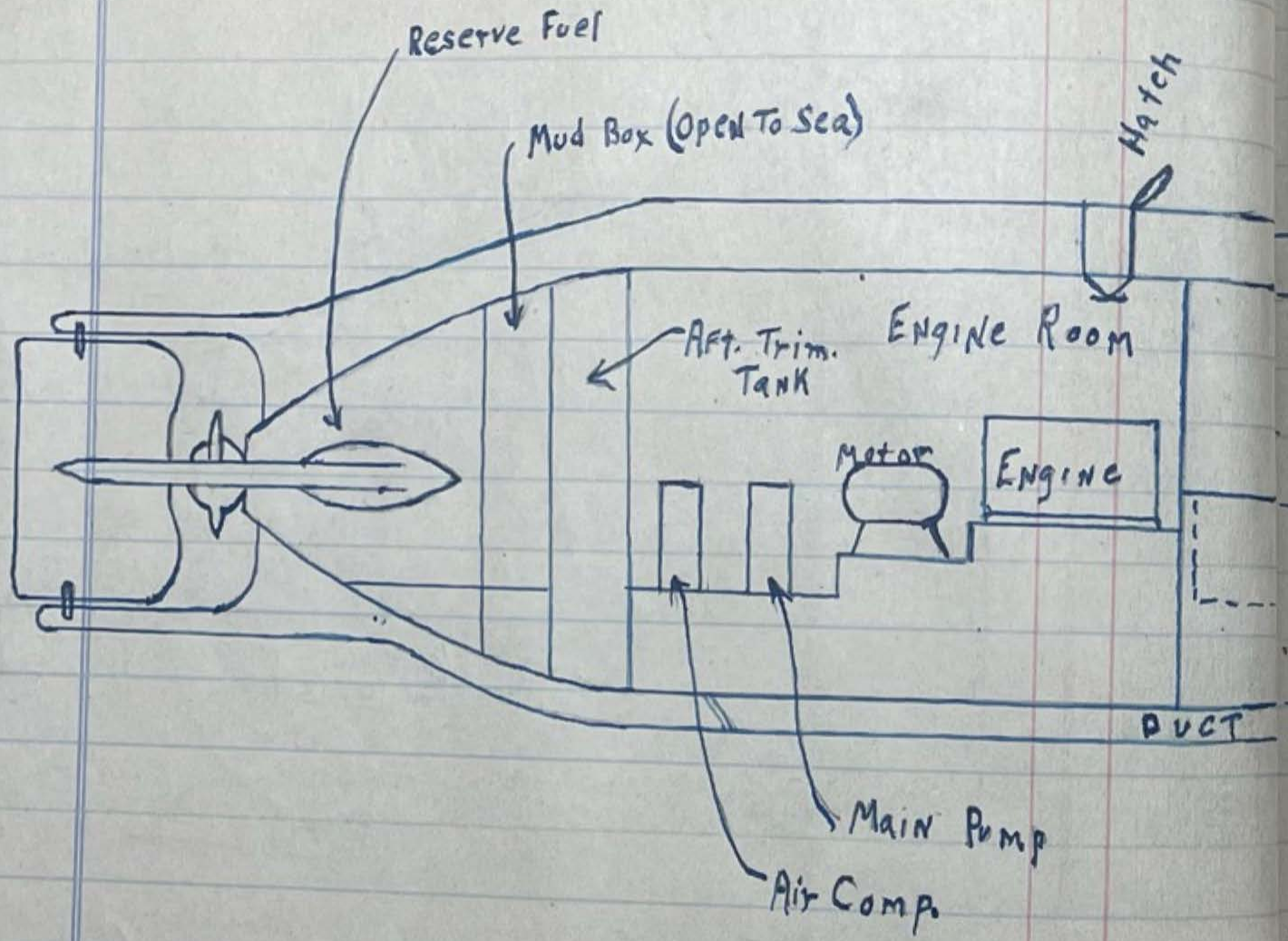

LAUBEUF (French)
LAURENTI (Italian)
LAKE TYPE
Water Level
Ballast Tanks
Thick Plating
Thin Plating
Keel
Superstructure
Main Ballast Tanks
Keel
Aux. Ballast Tank
W.T. Superstructure
Ballast Tank
Ballast Tank
Keel Cent.
Battery
Keel at Bow or Stern

# Flooding and Venting Tanks.

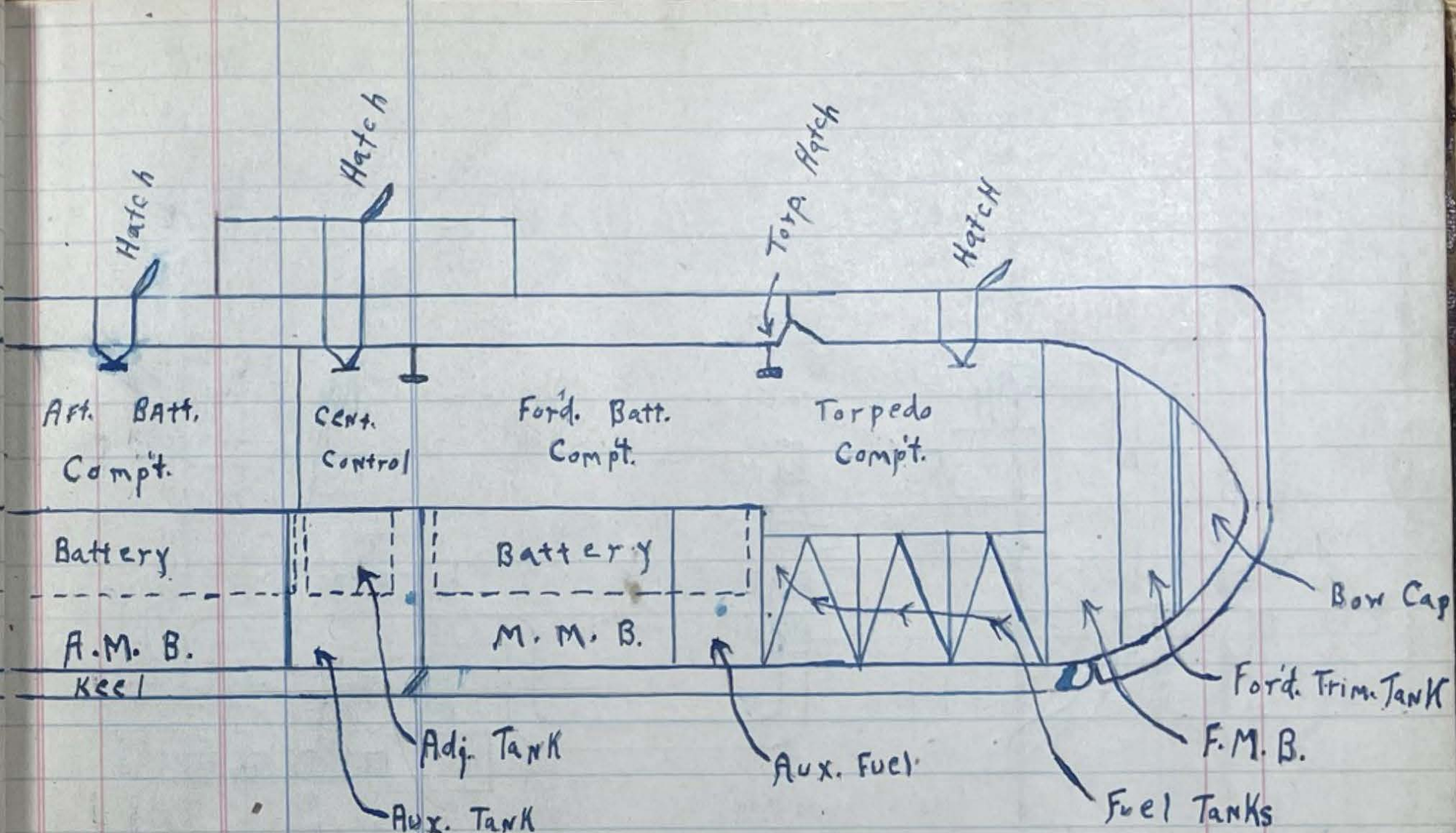



Opening Kingston Valve lets water into tank which forces air in tank through pipes to outboard vent.

Tank cannot flood with Vent closed.
" " be blown " " open.
" " drain " " closed.

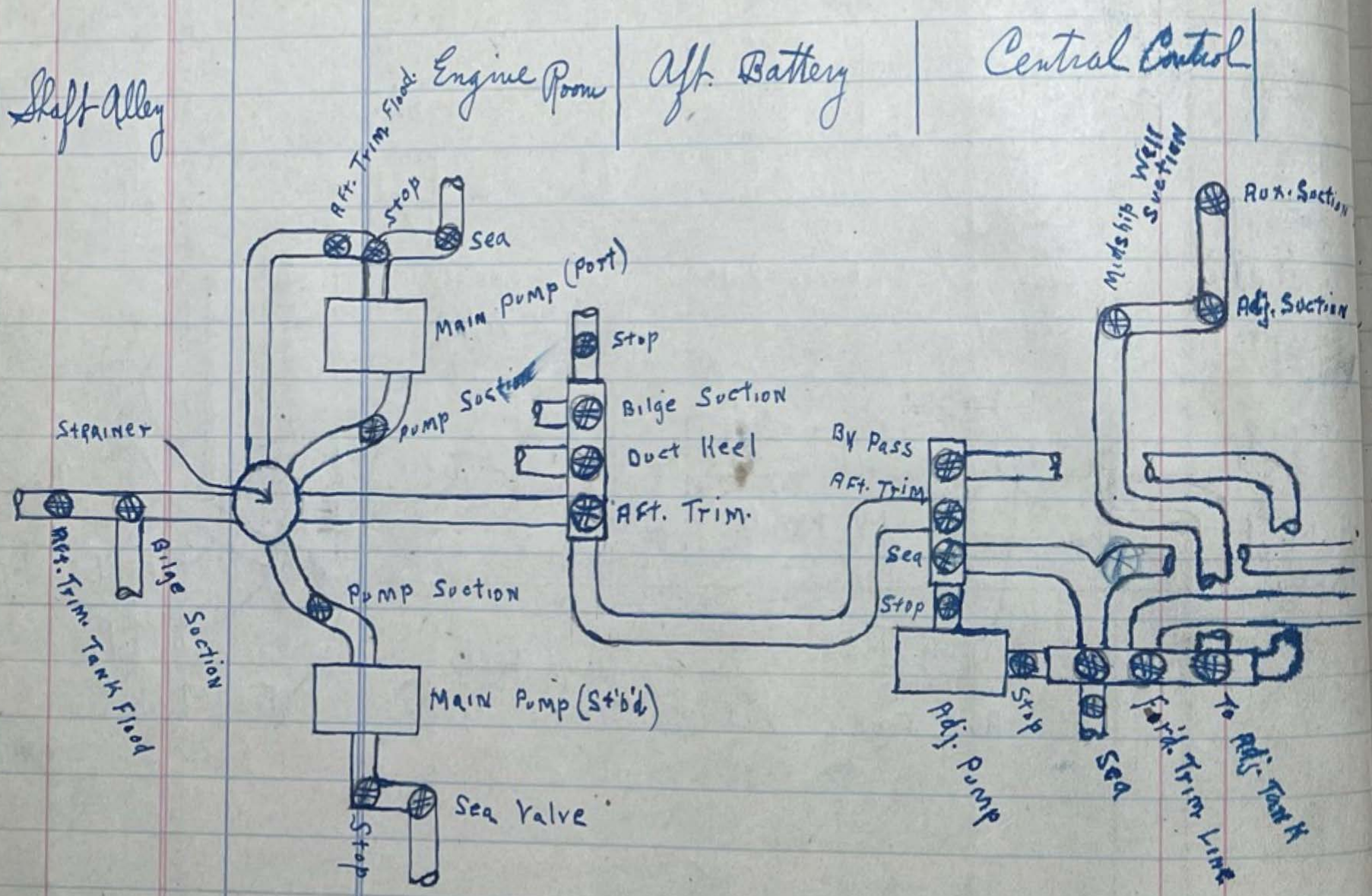



HOLLAND TYPE

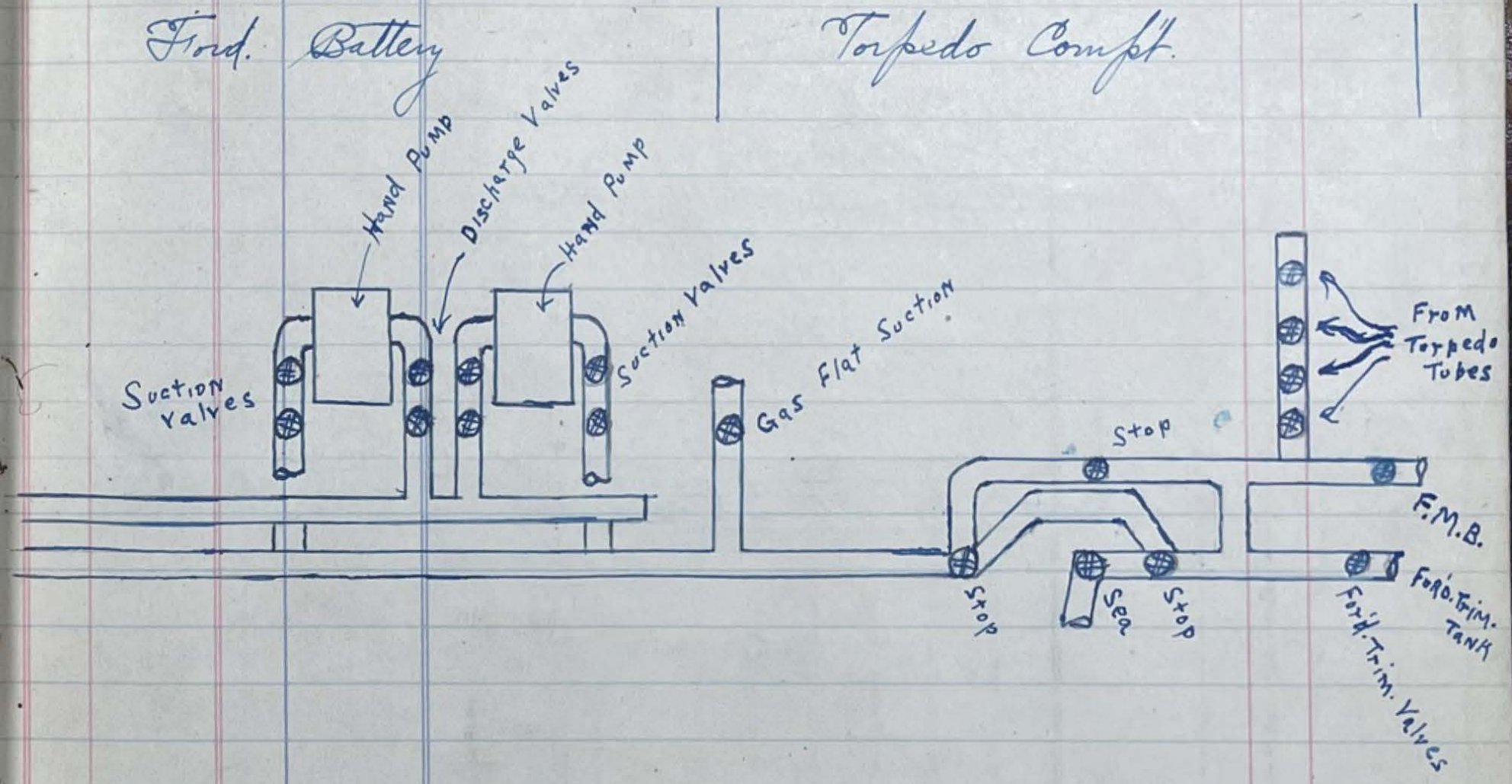

Hatch
Hatch
Torp Hatch
Hatch
Aft. Batt. Compt.
Cent. Control
Ford. Batt. Compt.
Torpedo Compt.
Battery
Battery
A.M.B.
M.M.B.
Keel
Bow Cap
Ford. Trim. Tank
F.M.B.
Fuel Tanks
Adj. Tank
Aux. Tank
Aux. Fuel

"D" TYPE.

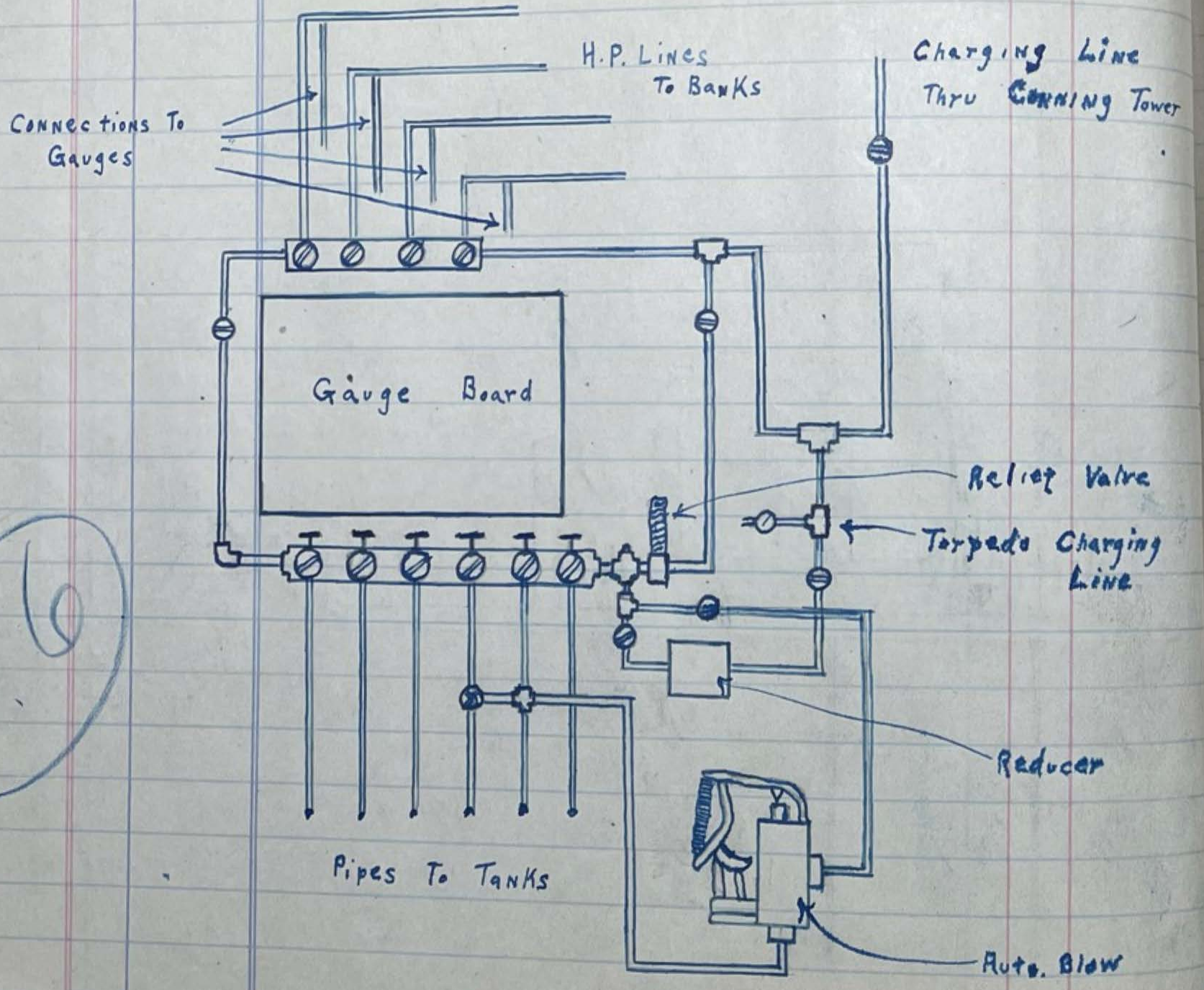
# TRIMMING LINE -



# Holland Boats.

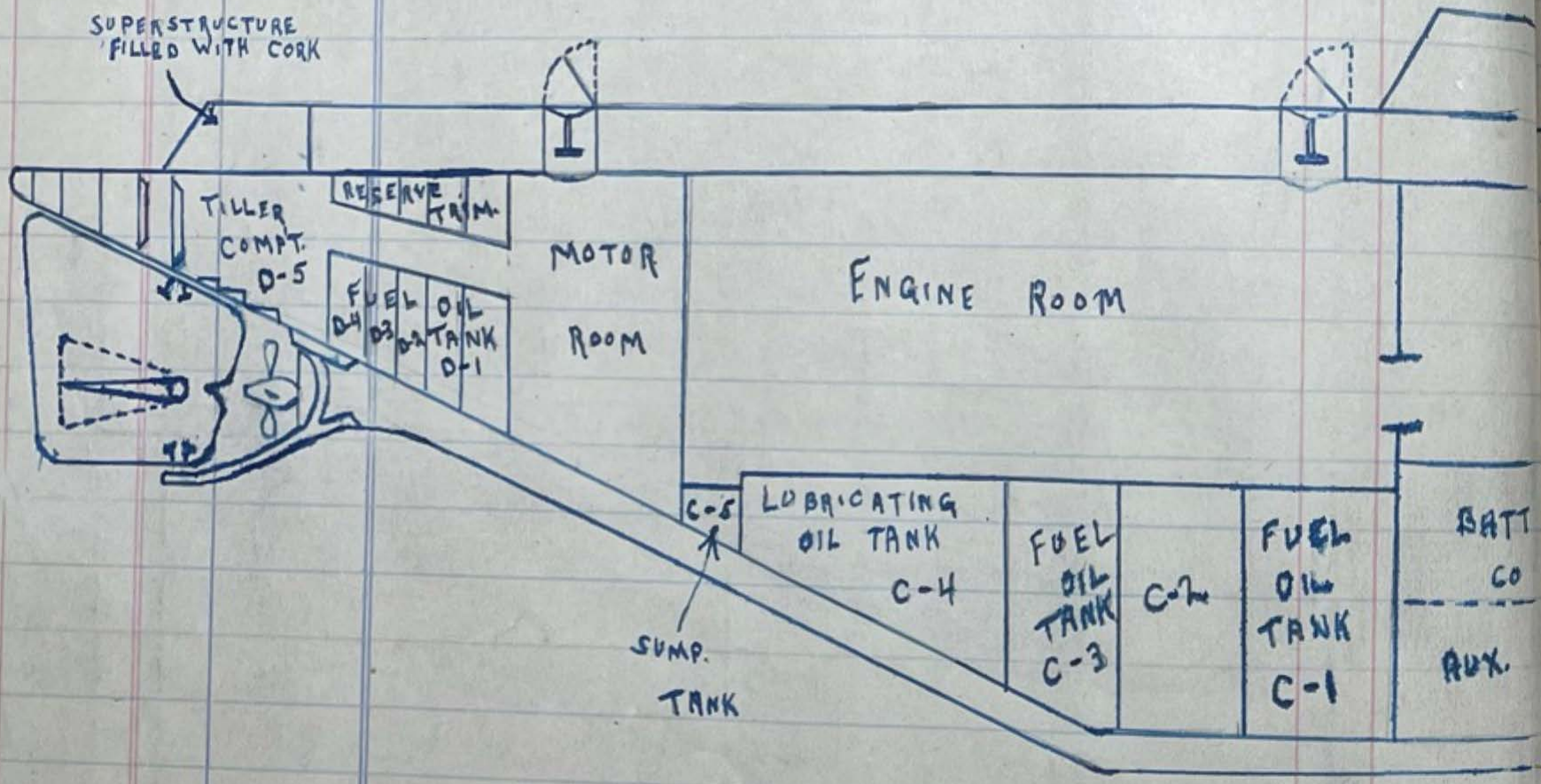


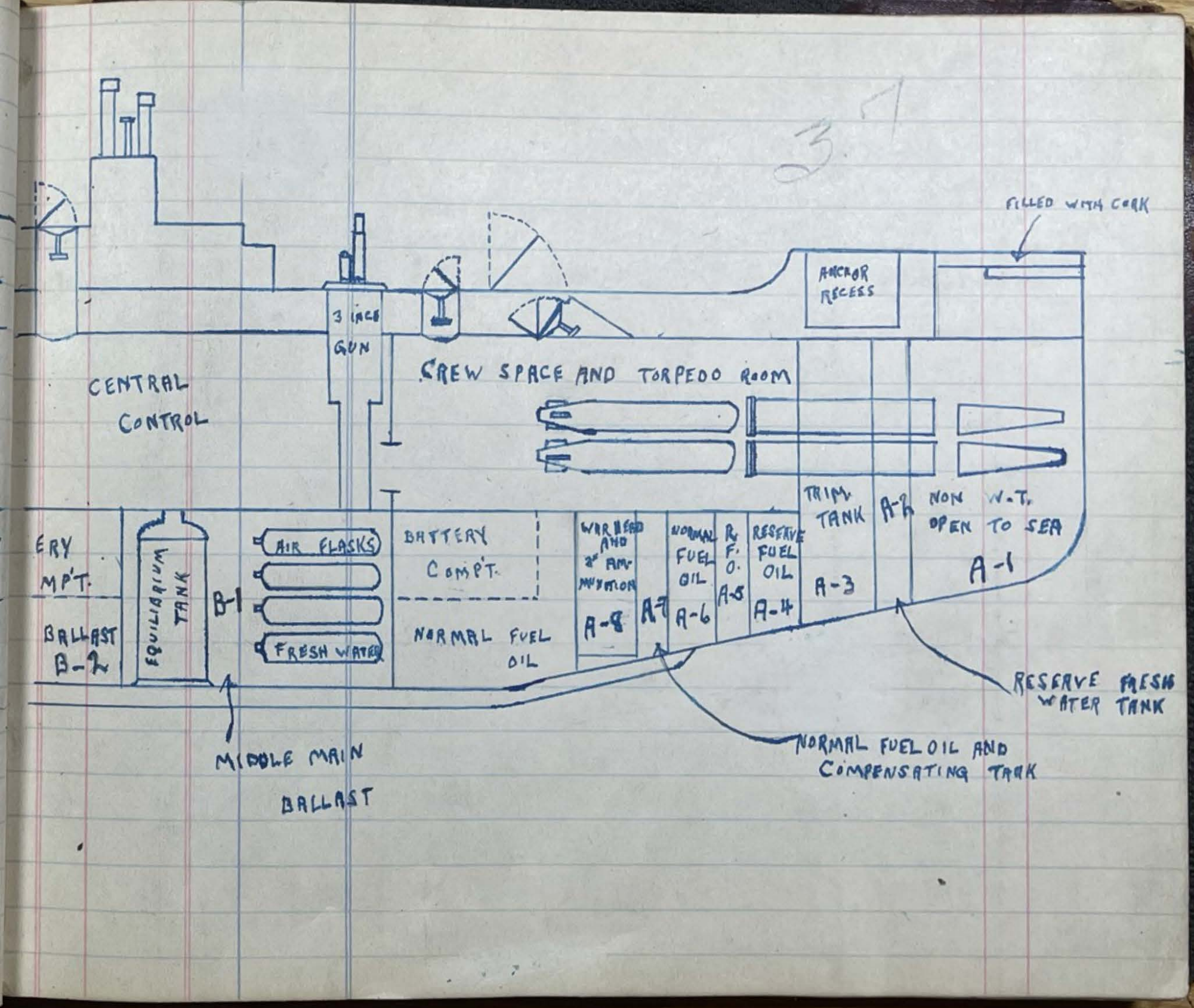
# AIR MANIFOLD - CENTRAL CONTROL COMP'T.




30

# LAKE TYPE


SUPERSTRUCTURE FILLED WITH CORK
TILLER COMPT. D-5
RESERVE TRIM.
FUEL OIL TANK D-1
D-2
D-3
D-4
MOTOR ROOM
ENGINE ROOM
C-5
LUBRICATING OIL TANK C-4
FUEL OIL TANK C-3
C-2
FUEL OIL TANK C-1
BATT
CO
AUX.
SUMP. TANK


3"1
FILLED WITH CORK
ANCHOR RECESS
3 INCH GUN
CREW SPACE AND TORPEDO ROOM
CENTRAL CONTROL
TRIM TANK
A-2
NON W.T. OPEN TO SEA
A-1
A-3
ERY
M'P'T.
BALLAST
B-2
EQUILIBRIUM TANK
B-1
AIR FLASKS
FRESH WATER
BATTERY COMP'T.
NORMAL FUEL OIL
WAR HEAD AND 2ND AMMUNITION
A-8
A-7
NORMAL FUEL OIL
A-6
R.F.O.
A-5
RESERVE FUEL OIL
A-4
RESERVE FRESH WATER TANK
NORMAL FUEL OIL AND COMPENSATING TANK
MIDDLE MAIN BALLAST

# SUBMARINE

| CLASS | No. IN CLASS | DISPLACEMENT | | RESERVE BOUYANCY | LENGTH OVER ALL | MOULDED AND EXTREME DIAMETER | SPEED AND RADIUS | | | | HORSE POWER | | TYPE OF BOAT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | SURFACE | | SUBMERGED | | | | |
| | | SURFACE | SUBMERGED | | | | FULL SPEED | CRUISE SPEED | 1 HR. RATE | 3 HR. RATE | TOTAL ENGINES | TOTAL MOTOR 3 HR. RATE | |
| A-1-7 | 6 | 106.55 | 122.55 | 12% | 63' 9⅞" | 11' 10¼" | 8.5 450 | 6 | 7.2 | 19.5 | 160 | 70 | HOLLAND |
| B-1-3 | 3 | 145 | 175 | 14% | 82' 5" | 12' 5½" | 9.6 850 | 7 5/10 | 8.2 | 25.5 | 250 | 115 | " |
| C-1-5 | 5 | 240 | 273 | 12% | 105' 3½" | 18' 10½" | 11 725 | 8.13 776 | 9.25 | 28 24 | 500 | 230 | " |
| D-1-3 | 3 | 288 | 337 | 11.6% | 134' 10" | 13' 10 5/8" | 13 910 | 9.6 1179 | 9.5 | 8 24 | 600 | 260 | " |
| E-1-2 | 2 | 287.2 | 342.1 | 14 % | 135' 3¾" | 14' 6 7/8" | 13.46 1900 | 10.7 2090 | 11.66 | 9 27 | 360 | 270 | " |
| F-1-3 | 3 | 330.2 | 400 | 17.5% | 142' 7" | 15' 4 7/8" | 1345 1344 | 11 2500 | 11.25 | 8.5 25.5 | 620 | 320 | " |
| G-1 | 1 | 400 | 516 | 22.4% | 161' | 13' | 11.5 | 10 2000 | 10 | 8 24 | 600 | 380 | LAKE |
| G-2 | 1 | 375 | 481 | 22.7% | 161' | 13' | 11 | 10.5 | 10.5 | 8.5 25.5 | 600 | 600 | " |
| G-3 | 1 | 393 | 468 | 14% | 161' | 13' 16⅝" | 14 | 3500 | 9.5 | 8.5 25.5 | 1200 | 380 | " |
| G-4 | 1 | 370.6 | 452.2 | 18% | 157' 5¼" | 17' 6 7/8" | 14 | 3200 | 9.5 | 8 24 | 920 | 490 | LAURENTI |
| H-1-3 | 3 | 358 | 434 | 17% | 150' 3⅝" | 15' 9 3/8" | 14 | 1345 2500 | 10.5 | 8.5 25.5 | 950 | 320 | HOLLAND |
| K-1-8 | 8 | 397.2 | 520 | 24.5% | 153' 1¼" | 16' 8' 1/8" | 14 1680 | 11 3150 | 10.5 | 8.5 25.5 | K1-4 950 K5-8 900 | 340 | " |
| L-1-4 L-5-8 | 7 | 450 | 548 | 18% | 168' 5⅞" | 16' 10 5/8" 17' 5⅛" | 14 1680 | 11 3150 | 10.5 | 8.5 25.5 | 900 | 340 | " |
| M-1 | 1 | 488 | 676 | 27.8% | 196' 3" | 19' 1½" | 14 1680 | 11 3150 | 10.5 | 8.5 25.5 | 1200 | 400 | LAKE |
| N-1-3 | 3 | 347.9 | 414.2 | 16.2% | 147' 3" | 15' 9¼" | 14 1680 | 11 3150 | 10.5 | 8.5 25.5 | 840 | 340 | SPEAR |
| N-4-7 | 4 | 331 | 385 | 14% | 155' | 14' 7" | 13 | 2500 | 11 | 5 30 6 HRS. | 960 | 280 | HOLLAND |
| O-1-10 | 10 | 520 | 629.3 | 17.3% | 172' 4" | 17' 5 1/16" | 14 2499 | 14 3000 | 10.5 | 5 20 6 HRS | 600 | 280 | LAKE |
| O-11-16 | 6 | 485 | 566 | 14.3% | 175' | 16' 3 3/8" | 14 | 14 3000 | 11 | 8.5 25.5 | 900 | 380 | HOLLAND |
| SCHLEY | 3 | 1106 | 1487 | 25.6% | 269' 9" | 22' 2" | 20 1440 | 14 3000 | 11.5 | 5 100 20 HRS. | 1000 | 380 | LAKE |
| 107-109-122 | 15 | 854 | 1092 | 22% | 231' | 21' 4 3/4" | 15 | 11 5500 | 12 1/4 | 9.4 25.2 | 4000 | 760 | SPEAR |
| | | | | | | | | | | | 1400 | 740 | C. & R. |

# DATA SHEET.

| TYPE OF ENGINE | STORAGE BATTERY TYPE | STORAGE BATTERY NO. OF CELLS | STORAGE BATTERY RATED CAPACITY 8 HR. RATE | TORPEDO TUBES BOW HULL / BOW SUPERSTR. | ARMAMENT | DEPTH OF HULL | DRAFT | REMARKS |
|---|---|---|---|---|---|---|---|---|
| 1 OTTO 4 CYLINDER GASOLINE | GOULD-EXIDE 23-W-S | 60 | 2250 | 1 B-H | 3 T | 13' | 10'7" | SINGLE SCREW A-2-3 GOULD. A-3-23W OTHERS 23W-S. |
| 1 Craig 4 Cycle 6 cylinder Gasoline | Exide 23 W Paste | 60 | 2800 | 2 B-H | 4 T | 15' | 10'7" | SINGLE SCREW |
| 2 CRAIG 4 C 6 CYLINDER Gas. | " | 120 | 2800 | 2 B-H | 4T | 16' | 10'10¼" | TWIN SCREW |
| 2 CRAIG 4 C. 6 CYLINDER GAS. | " | 120 | 2800 | 4 B-H | 4T | 15'2-5/8" | 11'8" | - |
| NELSECO DIESEL 4 C. 6 CYLINDER | GOULD 23 W. Plant Paste | 120 | 3 hrs. 2820 | 4 B-H | 4T | | 11'8" | BOW RUDDERS |
| F-1-2 NELSECO 4 C 8 CYL F-3 - CRAIG DIESSEL | EXIDE PASTE | 120 | 3 hrs. 3770 | 4 B-H | 4T | 16' 10½" | 12'2" | F-1-3 NEW ENGINES INSTALLED |
| WHITE AND MIDDLETON 4 C 6 CYL. GAS. | PLANT PASTE | 120 | 3 hrs. 3840 | 2 B-H | 2T | 16' 11.6" | 12'6" | DROP KEEL DIVING COMPT |
| " GASOLINE | " " | 120 | 2 hrs. 3840 | 2 B-H | 3T | 16' 4" | 13'7" | GROUND WHEELS FORE & APT DROP KEEL |
| SULZER DIESEL 2 C 6 CYL. | " Batt " | 120 | 4200-8 HRS | 2 B-S 2 S-2 B-H | 4T | 16' 4 3/16" | 12'10" | SUPERST. DRAWING NOT GROUND WHEELS FORE |
| 4 FIAT 4 C. 6 CYL. GAS. | PASTE | 164 | 3 hrs. 7176 | 2 S.H. - 2 B.H. | 8 T. | 15' 13/8" | 11'2.3/16" | - |
| NELSECO 2 C. 6 CYL. | EXIDE PASTE | 120 | 2 hrs 3808 | 4 B-H | 8 T | 17' 2.5" | 12'5" | - |
| NELSECO 2 C. 8 CYL. | GOULD PASTE | 120 | 4000 3 HRS. | 4 B.H. | 8 T | 18' 3 1/16" | 13'1" | - |
| " 2 C. 6 CYL. | GOULD 23 W.L. PLANT PASTE | 120 | 3 HRS. 4150 | 4 B.H. | 8T 3" GUN | 19' | 13'7" | BOW BALLAST TANKS. |
| BUSH-SULZER-DIESEL 2 CYL. | EXIDE 29-U PASTE | 120 | 3 HRS. 4050 | 4 B.H | 8T " | 17' 9 3/16" | 13'3" | BUILT AT GOV'T. of PORTS X.H. |
| NELSECO-M.A.N. 2 CYL. Gas Engine | GOULD 27 W.L. PASTE | 120 | 3 HRS. 4600 | 4 B.H. | 8T | 16' 10½" | 11' | - |
| NELSECO-4 C.-8 CYL. | PLANTE PASTE | 120 | 3 HRS. 2970 | 4 B.H. | 8T 3" GUN | 17' 1/4" | 12'5 3/4" | - |
| BUSH-SULZER-DIESEL 2 C. 6 CYL. | EXIDE PASTE | 120 | 3 HRS. 3135 | 4 B.H. | 8T. 1 MACH. GUN | 16' 6" | 12'4" | - |
| NELSECO 4 C. 6 CYL. | PLANTE PASTE | 120 | 918 KWH 3 HRS. | 4 B H | 8 T. 3" GUN | 19' 9 3/4" | 14'5" | INDIVIDUAL TUBE DOORS WITH BOW CAP |
| BUSH-SULZER-DIESEL 4 C. 6 CYL. | IRONCLAD " | 120 | 942.4 KWH " | 4 B H | 8T. " | 18' 3½" | 13'10¼" | " |
| 4 NELSECO 4 C. 6 CYL. | GOULD " | 120 | | 4 B H | 12 T. 2-3" GUNS | 21' 8 7/8" | 14' 1" | - |
| NELSECO 4 C. 2-8 CYL. | IRONCLAD | 120 | 3 HRS. 1240 K.W.H. | 4 B H | 12 T. 21" 3" GUN | 19' 6" | | ALTISCOPE - HYDROPLANES FORE & APT. |

Inspection of Submarines.

Station I. 3 hrs. time for inspection.

## THE MAIN BALLAST.

Locate main ballast tanks, and state into how many parts main ballast is divided. Find out capacities of each main ballast tank. By what means are they flooded. Ascertain course of the flooding water whether through a seachest or direct through the sea valve.

Look up the vents whether inboard or outboard: state where they are; and how to ascertain whether tanks are completely flooded.

From where are the tanks blown? Trace the blow lines as completely as possible from source to entrance into tanks.

What means are used to pump the main ballast tanks, whether reciprocating or rotary pumps, and how many.

Trace the course of the water from main ballast tanks to the pumps, and look up the overboard discharge from the pumps. (In looking up the lines ascertain their approximate position if you can not see them; but be sure that you can always imagine the course of the water as a continuous whole to the overboard discharge.

## Station II. Time 5 hrs.

### SECONDARY BALLAST AND TRIM TANKS.

Locate all trim and secondary ballast tanks and their capacities. How flooded, vented and blown; also trace the lines for flooding and venting. Are these tanks vented inboard or outboard?

Can these tanks be pumped? Trace the pumping of these tanks overboard. What is the pump used for pumping these tanks called. Can you pump from the forward trim to adjusting and vice versa? From after trim to adjusting and vice versa? Is it possible to pump from any of the trim and secondary ballast tanks with the main ballast pumps?

## Station III.

### TRIMMING LINES.

Examine the adjusting manifold and state what connections it makes. Trace the trimming line and full length of the boat and state what tanks it serves. What manifolds do you find on the trimming line besides the adjusting manifold? Is the trimming line used for pumping or blowing through of fuel oil? Where is the connection made from the trimming line, so that fuel oil tanks can be flooded with water. Can you pump the fuel oil tanks with the adjusting pump from forward to aft and vice versa? How many ways can the fuel tanks have their oil transfered between them in the forward group. In the after group.

Is there a separate system for the fuel tanks whereby they may be filled and blown through? Is this one continuous system for the fuel tanks forward and aft; or is it necessary to use the trimming line for transferring oil from the foward part of the boat, and vice versa?

Station IV. 5 hrs.

## THE COMPRESSED AIR SYSTEM.

Where is the high pressure air stored; in how many banks and at what pressure? Trace the main high pressure air lines. State how the main air line receives its air from the air banks. Assuming that the air line is open to an air bank, trace the course of the air to the air manifold stating what changes of pressure it undergoes and what means are used to reduce the pressure of the incoming air. What is the purpose of the 100 lbs. volume tank.

What is the automatic blow and what tanks does it serve. Look up how the automatic blow valve receives its air for blowing; also the line whereby the air reaches the tanks. Can one tank only be blown with the automatic blow?

Station V.

## HAND PUMPS. CONNING TOWER.

Where are the hand pumps located? Out of what tanks can they take a suction and have they independent suction lines to these tanks; also can they take a suction from the trimming line. Where is the discharge overboard to the hand pumps?

How is the conning tower fitted up as an escape lock in case of emergency.

Can the outboard hatch of the tower be opened or closed from the interior of the boat, and where is the mechanism for this purpose situated. When used as an escape lock, to where does the water drain out of the tower.

## Station VI.

## MISCELLANEOUS.

State what kind of submarine signalling apparatus is used whether submarine bell or oscillator. Where are these situated? If submarine bell, explain how operated.

How many periscopes, and what type; stating whether a walk-around type and what make? Is it a housing type?

Describe the salvage system on the boat. Is it possible to put an air pressure on any compartment from the central control station?

## Station VII.

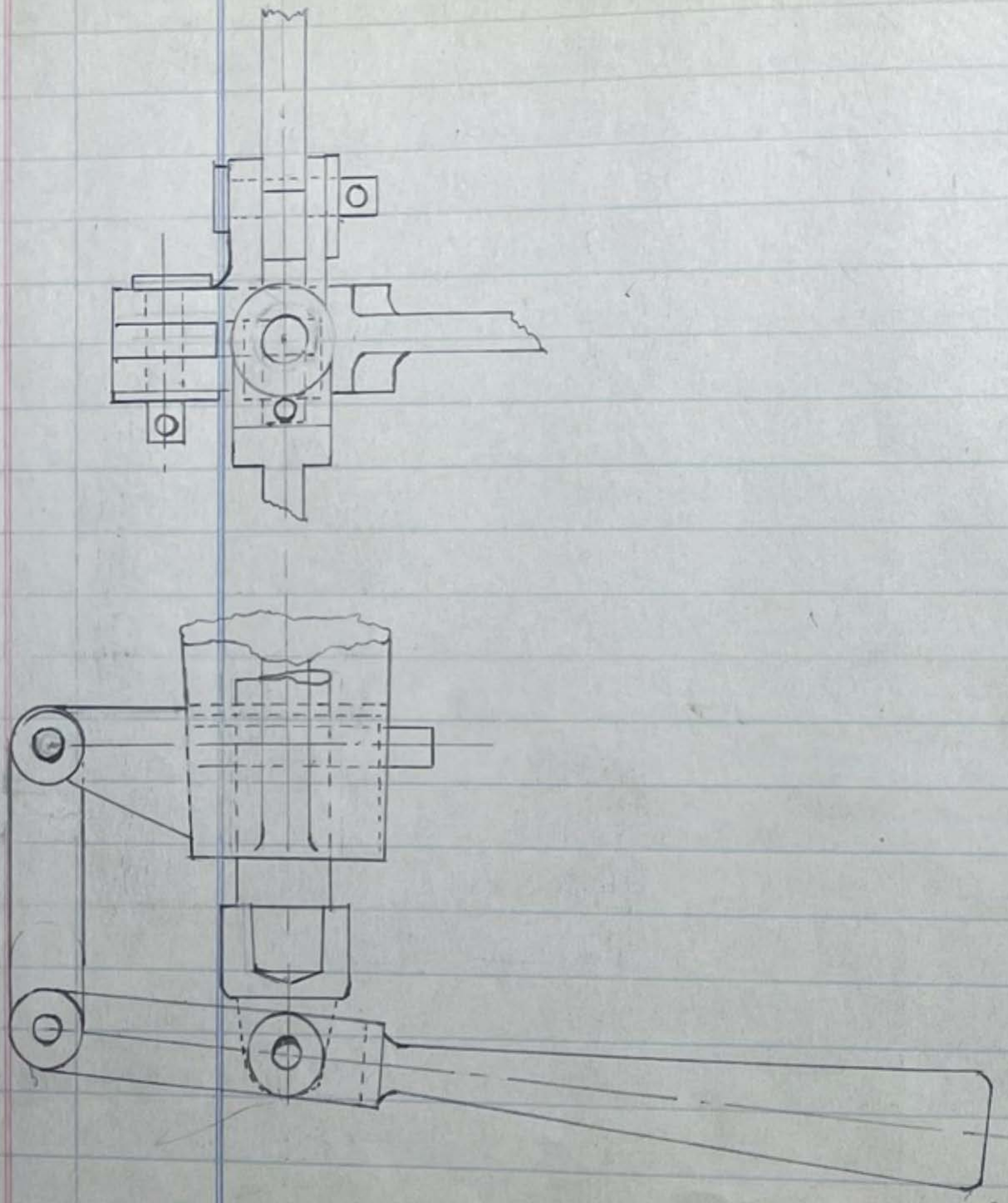
## ORDNANCE.

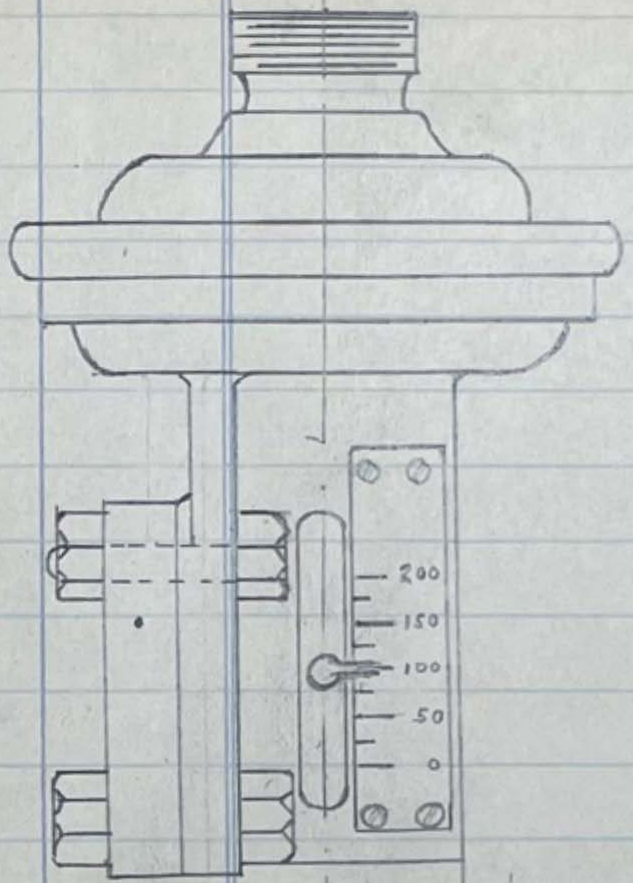
Find out how the muzzles of the torpedo tubes may be opened for discharge of torpedo. What is the interlocking gear for; explain briefly its operation. How may the torpedo tubes be flooded? State the vents and blow lines to the tubes.

Trace the air from source to tube for firing torpedoes. What pressure is maintained in the expulsion tank when firing? Why is the expulsion air system on the 200 lbs. line? Is there any difference in weight when the tubes are flooded

with water and when the torpedoes are in the tubes ready for firing with tube muzzles open to sea.

What precaution must be taken when a torpedo is in a tube?




200
150
100
50
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